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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/896,206	06/29/2001	Michal Cierniak	2207/11235	7577

7590 03/06/2006

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EXAMINER

TRUONG, LECHI

ART UNIT

PAPER NUMBER

2194

DATE MAILED: 03/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/896,206	Applicant(s) CIERNIAK, MICHAL	
	Examiner LeChi Truong	Art Unit 2194	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.


Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.


WILLIAM THOMSON
SUPERVISORY PATENT EXAMINER

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-16 are presented for the examination.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 8, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US. Patent 5,754,862) in view of Law (US. Patent 5,794,041).

As to claim 1, Jones teaches the invention substantially as claimed including: a class (the class, col 5, ln 15-53/col 7, ln 1-25/col 12, ln 35-67), implement (implement, col 5, ln 44-67), a function (the function members 603,604,605,607, col 12, ln 35-67/ Fig. 6), an vtable (virtual function table, col 5, ln 15-53/col 7, ln 1-25/col 12, ln 35-67/ Fig. 6), a first pointer (B1:fa11 603, col 12, ln 35-67/ Fig. 6), an object (the data structure 601, col 5, ln 15-53/col 7, ln 1-25/col 12, ln 35-67/ Fig. 6), an instance of the class(instance of class, col 5, ln 43-59), second pointer(vfptr pointer, col 7, ln 1-4/A1::vfptr, col 11, ln 50-67/ col 12, ln 35-67, Fig. 6).

Jones does not explicitly teach the term the second pointer of an object configured to point to the interface vtable associated with the interface, the second pointer allowing for efficiency casting of references of an interface type into references whose type is defined by the

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class configured to implement the interface, a second pointer in an extra field of the object.

However, Law teaches the second pointer of an object configured to point to the interface vtable associated with the interface (virtual dispatch is efficiently implemented as an indirect function call through a table of function address, called a virtual function table or VFT... then any object of that class has a pointer to one of the class's VFTs and this pointer provides the mechanism for accessing the VFT. This pointer referred to as the VFT pointer, col 4, ln 49-6), the second pointer allowing for efficiency casting of references of an interface type into references whose type is defined by the class configured to implement the interface (Adjust the this pointer to the subobject X in the D object whose VFT contains the entry that has the address of E: f (), col 5, ln 1-5/ static type S is pointed to by p in a virtual function call p->f () and the actual function invoked I f defined in class E denoted by E:: f() an early cast in an adjustment of a this pointer to a subobject X in the D object whose VFT contains the entry that has an address of E::f (), col 4, ln 57-67), a second pointer in an extra field of the object(An object's layout for any class can be divided into that object's fixed and moveable parts, col 7, ln 61-64/ the VFT pointer of an object is at the lower address of its fixed part, col 8, ln 38-41/ any object of that class has a pointer to one of the class's VFTs and this pointer is referred to as the VFT pointer, col 4, ln 52-56).

It would have been obvious to one of the ordinary skill in the art at the time the invention was made to combine the teaching of Jones and Law because Law's the second pointer of an object configured to point to the interface vtable associated with the interface, the second pointer allowing for efficiency casting of references would improve the efficiency of Jones's system by allowing a way to share a virtual function table pointer and virtual base pointer with a direct virtual base.

As to claim 8, it is an apparatus claim of claim 1; therefore, it is rejected for the same reason as claim 1 above. In addition, Law teaches invoke a function (col 4, ln 60-65).

As to claim 10, it is an apparatus claim of claim 8; therefore, it is rejected for the same reason as claim 8 above.

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US. Patent 5,754,862) in view of Law (US. Patent 5,794,041), as applied to claim 1 above, and further in view of Jordan (US. Patent 6,016,392).

As to claim 7, Jones and Law do not teach interface vtable is indexed by the name of the function. However, Jordan teaches interface vtable is indexed by the name of the function (a pairing interface ID with the Vtable 416, col 3, ln 33-67/ Fig. 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Jones, Law and Jordan because Jordan's interface vtable is indexed by the name of the function would improve the use of Jones and Law's systems by allowing an interface list with information about which interfaces are supported on each class and relieve individual designers to devise complicated schemes to reduce memory consumption.

4. Claims 2, 3, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US. Patent 5,754,862) in view of Law (US. Patent 5,794,041), as applied to claim 1 above, and further in view of AP (Arrays, pointers, pointer arithmetic).

As to claim 2, Jones, Law do not teach a third pointer points to a canonical base address. However, AP teaches a third pointer points to a canonical base address (the new pointer point to X [1], sec 7.3, page 1-3).

It would have been obvious to one of the ordinary skill in the art at the time the invention was made to combine the teaching of Jones, Law and AP because AP's the new pointer point to X [1] would improve the flexibility of Jones and Law's systems by allocating the specified number of contiguous cells of the indicated type.

As to claim 3, AP teaches the pointer is located at a predefined offset from the second pointer, and adjacent to the second pointer (the new pointer equals the original value of the pointer by increased by the size of type involved (sec: 7.3, page 1).

As to claim 4, AP teaches the third pointer is adjacent to the second pointer (the third pointer is adjacent to the second pointer teaches X+0, X+1 pointer, sec 7.3, page 1-3).

5. Claims 5,6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US. Patent 5,754,862) in view of Law (US. Patent 5,794,041), as applied to claim 1 above, and further in view of Kathleen Fisher et al (What is an Object – Oriented Programming Language?)

As to claim 5, Jones, Law do not explicit teach the term a class vtable, fourth pointer (&(B3:Fa11. Fig. 14). However, Kathleen teaches a class vtable, fourth pointer (class's Vtable, the A vtable contains pointers to the methods, sec: 2.3, page 7/ Fig. 1/Fig. 2).

It would have been obvious to one of the ordinary skill in the art at the time the invention was made to combine the teaching of Jones, Law and Kathleen because Kathleen's class's

Vtable, the A vtable contains pointers to the methods would improve the efficiency of Jones and Law' systems by reducing the cost of method lookup to a simple indirection without searching by an ordinary function call.

As to claim 6, Jones teaches vtable is indexed by the name of function (the virtual function name afl1, col 14, ln 1-55, Fig. 10).

6. Claims 9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US. Patent 5,754,862) in view of Law (US. Patent 5,794,041), as applied to claim 1 above, and further in view of Danel Liang (Java programming).

As to claim 9, Jones, Law do not explicit teach an argument. However, Liang teaches an argument (an argument page 118, sec: passing objects to methods).

It would have been obvious to one of the ordinary skill in the art at the time the invention was made to combine the teaching of Jones, Law and Liang because Liang's an argument would improve the efficiency of Jones and Law's systems by providing great flexible, modularity and reusability for developing software.

As to claim 11, it is an apparatus claim of claim 9; therefore, it is rejected for the same reason as claim 9 above.

7. Claims 12, 15, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over TO (Object Reference casting) in view of Law (US. Patent 5,794,041).

As to claim 12, TO teach a first reference (reference, page 2, ln 26-50), an object (object, page 2, ln 26-50), a type (M1, page 2, ln 26-50), an interface (an interface, ln 26-50), a request to cast (cast, page 2, ln 26-50), a type defined by a class (class type, page 2, ln 26-50).

TO do not teach a pointer contained in the object, the pointer configured to point to a canonical base address of object, the pointer allowing for efficient casting of the first reference, a second pointer in an extra field of the object. However, Law teaches a pointer contained in the object, the pointer configured to point to a canonical base address of object (virtual dispatch is efficiency implemented as an indirect function call through a table of function address, called a virtual function table or VFT... then any object of that class has a pointer to one of the class's VFTs and this pointer provides the mechanism for accessing the VFT. This pointer referred to as the VFT pointer, col 4, ln 49-6), the pointer allowing for efficient casting of the first reference (Adjust the this pointer to the subobject X in the D object whose VFT contains the entry that has the address of E: f (), col 5, ln 1-5/ static type S is pointed to by p in a virtual function call p->f () and the actual function invoked I f defined in class E denoted by E: f () an early cast in an adjustment of a this pointer to a subobject X in the D object whose VFT contains the entry that has an address of E::f (), col 4, ln ln 57-67), a second pointer in an extra field of the object(An object's layout for any class can be divided into that object's fixed and moveable parts, col 7, ln 61-64/ the VFT pointer of an object is at the lower address of its fixed part, col 8, ln 38-41/ any object of that class has a pointer to one of the class's VFTs and this pointer is referred to as the VFT pointer, col 4, ln 52-56).

It would have been obvious to one of the ordinary skill in the art at the time the invention was made to combine the teaching of TO and Law because Law's a pointer contained in the

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object, the pointer configured to point to a canonical base address of object would improve the efficiency of TO's system by allowing a way to share a virtual function table pointer and virtual base pointer with a direct virtual base.

As to claims 15, 16, they are apparatus claims of claims 12, 13; therefore, they are rejected for the same reasons as claims 12, 13 above.

8. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over TO (Object Reference casting) in view of Law (US. Patent 5,794,041), as claimed in claim 1 above, in view in view of AP (Arrays, pointers, pointer arithmetic).

As to claim 13, TO and Law do not teach the pointer is located at a predefined offset from the second pointer, and adjacent to the second pointer. However, AP teaches the pointer is located at a predefined offset from the second pointer, and adjacent to the second pointer (the new pointer equals to X [1], sec 7.3, page 1-3).

It would have been obvious to one of the ordinary skill in the art at the time the invention was made to combine the teaching of TO, Law and AP because AP's the pointer is located at a predefined offset from the second pointer, and adjacent to the second pointer by would improve the use of TO and Law's systems by providing handle type safe casting between polymorphic classes of an object via pointers or references.

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over TO (Object Reference casting) in view of Law (US. Patent 5,794,041), as applied to claim 12 above, and further in view of Gartner et al (US. Patent 6,421,681 B1).

As to claim 14, TO, Law do explicitly not teach return the type defined by casting. However, Gartner teaches return the type defined by casting (return ... cast to object, col 18, line 1-20).

It would have been obvious to one of the ordinary skill in the art at the time the invention was made to combine the teaching of apply the teaching of TO, Law and Gartner because Gartner's return ... cast to object would improve the efficiency of TO, Law's systems by making method for dispatch of interface calls more consistent.

Response to the argument

10. Applicant's amendments filed 12/16/2005 have been considered but they are not persuasive.

In the remarks, applicant argued

- (1) " Object may include an extra field to contain the pointer ".
- (2) " Pointer may allow the efficient casting of references of an interface type into the references whose type is defined by the class that implements the interfaces".
- (3) " no mention in Law of a second pointer configured to point to the interface Vtable associated with the interface".

11. Examiner respectfully traversed applicant's remarks:

As to point (1), Law teaches an object's layout for any class can be divided into that object's fixed and moveable parts (col 7, ln 61-64)/ the VFT pointer of an object is at the lower address of its fixed part (col 8, ln 38-41)/ any object of that class has a pointer to one of the class's VFTs and this pointer is referred to as the VFT pointer (col 4, ln 52-56).

As to point (2), Law teaches any object of that class has a pointer to one of the class's VFTs and this pointer provides the mechanism for accessing the VFT. This pointer referred to as the VFT pointer(col 4, ln 49-6), the second pointer allowing for efficiency casting of references of an interface type into references whose type is defined by the class configured to implement the interface (Adjust the this pointer to the subobject X in the D object whose VFT contains the entry that has the address of E: f (). Such a this pointer adjustment is called an early cast(col 5, ln 1-5)/ static type S is pointed to by p in a virtual function call p->f () and the actual function invoked I f defined in class E denoted by E: f () an early cast in an adjustment of a this pointer to a subobject X in the D object whose VFT contains the entry that has an address of E: f ()(col 4, ln 57-67)/ An early cast is always a cast to a base class's subobject(col 16, ln 13-16)/ Perform an early cast to the subobject X in the D object whose VFT contains the entry that has the address of E::f(), col 18, ln 55-58/ early cast is an adjustment of a this pointer to a subobject X in the D object whose VFT contains the entry that has an address of E::f() , a late cast is an adjustment of the this pointer to point to E subobject(col 21, ln 15-25)

As to point (3), Law teaches Virtual dispatch is efficiency implemented as an direct function call through a table of function address called a virtual function table or VFT(col 4, ln 48-51)/ any object of that class has a pointer to one of the class's VFT and this pointer provides

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the mechanism for accessing the VFT. This pointer is referred to as VFT pointer, col 4, ln 52-56).

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LeChi Truong whose telephone number is (571) 272 3767. The examiner can normally be reached on 8 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomson, William can be reached on (571) 272 3718. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIP. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIP system, contact the Electronic Business Center (EBC) at 866-217-9197(toll-free).

LeChi Truong

March 1, 2006


WILLIAM THOMSON
SUPERVISORY PATENT EXAMINER